The Development of the STAR Tag Database for Event Selection

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STAR[1] is an experiment at the Relativistic Heavy Ion Collider (RHIC) accelerator of Brookhaven National Laboratory. The major component of the STAR detector is a Time Projection Chamber (TPC) which has been designed to search for signatures of quark-gluon plasma formation in collisions at RHIC. The RHIC accelerator program consists of high energy collisions of a number of different nuclei; the lion's share of the collisions in the first year of RHIC running will be the collision of gold nuclei on gold nuclei at 200 GeV per nucleon.

The central gold on gold collisions which will be observed in the STAR detector will produce thousands of tracks in the TPC as well as in the other detectors which make up the STAR experiment. The data recorded from a typical event will contain 20 Mbytes of raw detector information before the offline reconstruction has been performed. With a data collection rate of 1 event per second STAR expects to collect 200 Terabytes of raw data each year. Including the results of data processing and summary information, the total STAR data volume will be in excess of 300 Terabytes of data stored each year.

A database is being developed that will be used as an index to navigate through the STAR event store. This tag database will consist of physics analysis and summary information and pointers to the event headers for the STAR. Physicists will query the tag database to make a preliminary selection of interesting events prior to more extensive "batch-style" analysis.

In order to facilitate different options for data access the tag database has been created both in an Objectivity/DB[2] version and a Root[3] version. The entries in each of these two tag databases will each be created during the reconstruction of each event. This processing will take place after the event data is transferred from the experiment to the RHIC Computing Facility[4].

An additional purpose of the tag database is to feed the index of the storage manager component of the HENP Grand Challenge[5] software. Some subset of the information in the tag for each event will be passed to the Grand Challenge Query Estimator to be indexed. This "bit-sliced" index will allow physicists to pass range queries to the Grand Challenge Architecture.

In September 1998 the STAR experiment had its first Mock Data Challenge. During this period a pure Objectivity/DB tag database was available. This was used for grand challenge index building as well as for event selection queries of the STAR event store.

The second STAR mock data challenge will occur in March 1999. During this period both the root and Objectivity/DB tag databases will be in use. The introduction of root to the tag data base will make it much easier for individual physicists to analyze the tag database as well as to make copies of the STAR tag information for off-site analysis.

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[1] The STAR home page http://www.rhic.bnl.gov/STAR/

[2] The Objectivity Web Page http://www.objectivity.com/

[3] The Root Web Page http://root.cern.ch/

[4] RCF http://www.rhic.bnl.gov/RCF/

[5] The Grand Challenge Web Page http://www-rnc.lbl.gov/GC/